US-PAT-NO: **5421464**

DOCUMENT-IDENTIFIER: US 5421464 A

TITLE: Method for sequencing letters in mail-sorting
facilities

DATE-ISSUED: June 6, 1995

INVENTOR-INFORMATION:

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COUNTRY	TYPE CODE		
Licentia	Frankfurt	N/A	N/A
DE	03		
Patent-Verwaltungs-GmbH			

APPL-NO: 08/ 187558

DATE FILED: January 28, 1994

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
DE	43 02 231.6	January 28, 1993

INT-CL: [06] B07C005/00,B65H005/22

US-CL-ISSUED: 209/584, 209/900 , 271/3.1

US-CL-CURRENT: 209/584, 209/900 , 271/3.13

FIELD-OF-SEARCH: 209/563; 209/564 ; 209/583 ; 209/584 ; 209/630 ;
209/900
                 ; 198/418.2 ; 198/449 ; 271/3 ; 271/3.1 ; 271/9 ;
271/35

REF-CITED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME

ABSTRACT:

In the method of the invention for sequencing parcels in mail-sorting facilities having rows of stacking compartments, a sorting plan is used for sorting the parcels in which an overfilling of the individual stacking compartments is avoided so that, during one sorting procedure, the stacking compartments are not emptied, and that, after a sorting procedure has ended, an in-sequence transfer of the parcels is effected from the stacking compartments into a conveying device disposed opposite the stacking compartments or into containers.

7 Claims, 4 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 2

BRIEF SUMMARY:

(1)   BACKGROUND OF THE INVENTION

(2)   The invention relates to a method for improved sequencing of
letters in
mail-sorting facilities.

(3)   In mail-sorting facilities, mailed items, particularly letters,
are
sorted in a pre-sorting procedure and deposited into a number of
stacking
compartments. The extent of sorting that can be achieved is
determined by the
number of stacking compartments into which the mailed items are
distributed.
Often it is neither desired nor possible, for practical reasons, to
provide
each of the smallest classes of a sorting procedure with its own
sorting
compartment. For example, when the mailed items are to be sorted
corresponding
to the sequence of a distribution in the postal route, a separate
sorting
compartment for each mail recipient is not necessary. Rather, the
mailed items
are distributed into a specific number of stacking compartments in
the same
sequence in which they will later be distributed by the sorter during
the
distribution process. The mailed items are arranged inside each
sorting
compartment to correspond to the stipulated sequence so that, in a
corresponding arrangement of the stacking compartments, all of the
mailed items
are arranged according to the stipulated sequence. To permit sorting
facilities to use a relatively small number of stacking compartments,
the
mailed items are sorted multiple times and possibly indirectly, as
described,
for example, in the Proceedings USPS Advanced Technology Conference,
Washington, D.C., of Dec. 2, 1992, pp. 1061-1974.

(4)   Mail-sorting facilities are known in which the stacking
compartments are

disposed opposite the mail input, so that after each sorting procedure that is
followed by a further sorting procedure, the mailed items can be quickly taken
manually from the stacking compartments and reinserted into an input module.
In manual transfer, the mailed items are respectively transferred by the
handful from the compartment into containers opposite the stacking compartments
and that are mounted on a mobile base. It is conventional that the containers
possess a larger holding capacity than the stacking compartments, which must be
emptied multiple times for transfer during each sorting procedure. A
prerequisite for sequencing in accordance with the above-described method is
that the sequence of the parcels be strictly maintained, i.e., the sequence
integrity after the first and all subsequent sorting procedures. It is thus
necessary that the containers be brought back into the correct sequence after
each sorting procedure with the mobile base or additional transport means for
mail input, or sorted into suitable groups for further processing after the
last sorting procedure. Particular drawbacks of the prior art are that at
least two operators are required for mail input and emptying the compartments.
Further, restacking or interim stacking of the mailed items in containers
requires a greater space requirement and increases the risk of disturbing the
sequence integrity, because the stacks in the containers can easily capsize
when the container is only partly filled, and the produced sequence can thus be
disturbed. Further, the stacks can inadvertently be loaded into the wrong
containers, or the sequence of the containers can be disturbed.

(5)   SUMMARY OF THE INVENTION

(6)   The object of the present invention is a method that avoids the described
drawbacks of the prior art and permits a simple, fast and reliable sequencing
of the mailed items with retention of the sequence integrity. In

comparison to
the prior art, the method of the invention has the advantage that only one
operator is required, that practically no partially-filled containers result,
that the risk of disturbing the sequence integrity is reduced, and that less
space is required.

(7)   The object is attained by providing a method for sequencing parcels in
aisle sequence during a plurality of sorting procedures in mail-sorting
facilities that have rows of stacking compartments. The method comprises the
steps of sorting the parcels into the stacking compartments in accordance with
a plan in which every or almost every one of the stacking compartments is
filled at the most to its maximum filling capacity during a sorting procedure.
If a stacking compartment is filed to overflowing, it is allocated an overflow
compartment, in which the further stacking is effected. During one sorting
procedure the stacking compartments are not emptied. After the end of a
sorting procedure, an aisle-sequence transfer of the parcels from the stacking
compartments into a conveying device disposed opposite the stacking
compartments or into containers is performed.

(8)   The invention is based on the idea of not emptying the stacking
compartments during the sorting procedure in a sequencing method, and using a
sorting plan in which, if possible, no stacking compartment is filled to
overflowing or overflows, and after the sorting procedure has ended, directly
transferring the contents of the stacking compartments in sequence into a
conveying device that serves the input module or into containers, and supplying
the contents in sequence to the input module or for further processing.

(9)   The invention is described in detail below by means of drawings.

DRAWING DESCRIPTION:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a mail-sorting facility for executing the method of the
invention,

FIG. 2 illustrates the allocation of the contents of a container to the
individual stacking compartments after unloading the compartments for the case
that two compartments are assigned to each (destination),

FIG. 3 shows the sequence of the sequenced parcels in the stacking
compartments for an 800-destination route,

FIG. 4 shows the sequence of the sequenced parcels in the containers for an
800-destination route.

DETAILED DESCRIPTION:

(1)   DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

(2)   FIG. 1 schematically shows a mail-sorting facility for executing the
method of the invention, in which a number of stacking compartments 1 are
disposed opposite a conveying device 2, with which the parcels 3, which have
been filled into transport containers 4, are transported to the input module 5.
A transfer bridge 6, as is known, for example, from DE 4,236,507, is disposed
between the stacking compartments and can be moved along the row of stacking
compartments 1. Transfer bridge 6 serves in the fast and reliable transfer of
the parcels from the stacking compartments 1 into the containers 4, and
subsequent transport to the conveying device 2.

(3)   For simplification, the invention is described below by way of an example
of sequencing in two sorting procedures, because it is apparent to a person
skilled in the art how the method is to be generalized for more than two
sorting procedures. As is conventional, in the first sorting procedure,

sorting is performed according to the least significant digit (LSD).
The
sorting plan is designed such that, if possible, individual stacking
compartments are prevented from being filled to overflowing. Such an
optimization is possible because, in accordance with the invention,
the mail
volume for specific destinations only fluctuates by limited amounts
from
statistical mean values determined by means of measurements and that
can be the
basis of the sorting plan. In the method of the invention, no
compartment is
emptied during the first sorting procedure. After the end of the
sorting
procedure, the parcels are transferred directly from the stacking
compartments
1 into the containers 4 by means of the transfer bridge 6, and
compartments are
emptied in sequence one after the other into a container until it is
full. The
transfer bridge forms a throughgoing glide path between a stacking
compartment
and the conveying device located opposite, respectively. In this way
the
occurrence of partially-filled containers is extensively avoided.
Thus,
possible problems with stacks of mailed items tipping over inside the
containers is minimized. The filled containers are disposed one
behind the
other in the conveying device 2. A conveyor belt 2' whose width
approximately
corresponds to the width of the used transport container 4 is
preferably
provided for this device. The emptying of the compartments into the
containers
and the arrangement of the containers inside the conveying device,
that is, on
the conveyor belt 2', is effected in sequence. If, for example, the
LSD
includes the elements a, b, c, d, e, f, g, h, i, k in ascending
order, as shown
in FIG. 1, emptying of the compartments is effected in the order k,
i, h, g, f,
e, d, c, b, a, and the parcels are arranged in each container such
that the
highest elements of the LSD are stacked at the end of the container,
the lowest
at the front. The containers are placed on the conveyor belt such
that the end
of a container that is newly-placed onto the conveyor belt is

contiguous with
the front side of a container already located on the conveyor belt.
Such an
arrangement is preferably achieved in that the transfer bridge has a
funnel-shaped, asymmetrical extension. By this compulsory
arrangement and
conveyance of the containers, it is avoided that the sequence of
containers and
thus the sequence integrity is disturbed. The described type of
transfer is
realized in a mail-sorting facility in FIG. 1 in the following
manner: the
transfer bridge 6 is moved along the row of stacking compartments by
an
operator in such a way that the sequence k, i, h, g, f, e, d, c, b, a
of the
stacking compartments is followed, that is, from right to left in
FIG. 1. The
operator goes behind the bridge 6, lifts with the right hand the
separating
blade typically used in the stacking compartments to stabilize the
parcels,
supports the stacked parcels with the left hand, returns the
separating blade
to its initial position, and subsequently pushes the parcel stack
with both
hands into the container located on the bridge. In case the parcel
stack does
not fit completely into the space available in the container, first a
part of
the stack is removed from the compartment, and the remainder is again
secured
with the separating blade. The filled container is pivoted onto the
conveyor
belt, corresponding to a pivoting motion of the operator toward the
left, as is
the case in FIG. 1, so that the last parcel inserted into the
container is on
the side of the container facing the input module. Subsequently the
operator
takes an empty container and begins to fill it with the remaining
parcels. The
conveyor belt 2 preferably ends in front of the input module, so that
the
containers can simply be pushed or transferred into the module.

(4)   In the second sorting procedure, the parcels are sorted
according to the
most significant digit (MSD) and placed in the stacking compartments,
wherein

it is assured by means of a correspondingly optimized sorting plan that, if
possible, the stacking compartments also do not overflow in the second sorting
procedure. After the end of the sorting procedure, the compartments are
emptied in the same manner into the containers, and the containers are placed
onto the conveyor belt as in sorting procedure 1. The containers are removed
from the sorting belt according to sequence, transferred into appropriate carts
7 and supplied for further processing.

(5)   Of course, the method of the invention is not limited to the use of
containers. Rather, it is possible in accordance with sorting procedure 1 to
remove the parcels directly from the stacking compartments 1 and push them via
a transfer bridge onto the conveyor belt 2, so that the parcels are
subsequently supplied in sequence to the input module. For this it is only
required that the parcel stacks lie closely together on the conveyor belt 2 so
that tipping of the parcels is prevented. This can be achieved, for example,
by means of a correspondingly controlled later guidance of the conveyor belt 2,
by which the parcels 3 lying on the conveyor belt 2 are guided to the transfer
bridge 6 when the respective stack pair is emptied.

(6)   Illustrated below is the dimensioning of a mail-sorting facility having
200 stacking compartments that have a respective stack capacity of 350 parcels
for the case of 2000 or 1500 parcels per sorter.

(7)   In a system having 200 stacking compartments per 350 loads, a maximum of
70,000 parcels can be processed in a sequencing procedure. In order to have
reserves for different parcel thicknesses and compartments to be filled to
different capacities, only 70% of the maximum capacity, that is, approximately
50,000 parcels, are processed. It is assumed that each sorter services 800
destinations. This means that, for example, with a number of 2000

parcels per
sorter, 25 sorters are required for each sequencing procedure. With 200
stacking compartments, it is known that a maximum of 200.multidot.200
destinations are available (see, for example, Proceedings USPS Advanced
Technology Conference, Washington, Dec. 2, 1992, pp. 1061-1074). The
situation for the above-described different numbers of parcels for sorters has
been compiled as an overview in the following table.

(1)   _____ Example A B

	Example	A	B
Parcels/Sorter*		2,000	1,500
Delivery Destinations/Sorter		800	800
Total Number of Delivery Destinations		20,000	26,400
Available (200 .multidot. 200)		40,000	40,000

* = Average Values

(8) It can be seen from the table that in example A, two more compartments
per location can be omitted in the first sorting procedure, in example B two
more compartments for every second location. In such a case the first
compartment is first filled, then steered toward the second, contiguous
stacking compartment. The sequencing procedure for example A will be explained
in more detail below. In the first sorting procedure, what is placed into the
compartments is

(2)   _____ 1 + 2: DSN 001, 101,
201, 301,
401, 501, 601, 701 3 + 4: DSN 002, 102, 202, 302, 402, 502, 502, 702
5 + 6:
DSN 003, 103, 203, 303, 403, 503, 603, 703 etc. 199 + 200: DSN 100, 200, 300,
400, 500, 600, 700, 800   _____

(9) wherein the destinations of the sorter are numbered with DSN (delivery
sequence number).

(10) As already described above, transferring the parcels into the containers
begins at the rear, so that the highest values of the DSNs are stacked at the
end of the container, and the lowest, in contrast, at the front. For

example
A, FIG. 2 shows the parcels 3 of a container 4 after the first
through sixth
compartments have been emptied, wherein the first stacking
compartment is
indicated by 1'. The contents of the first and second stacking
compartments
are stacked at the end of the container, while the contents of the
first and
second stacking compartments are located at the front. Thus, if the
mailed
items are removed from the container after the first sorting
procedure, the
contents of stacking compartment 1 are distributed as the first in
sorting
procedure 2, and are located at the front end of the respective
stacking
compartments in which the parcels have been stacked.

(11)   In the second sorting procedure, each sorter in example A has
eight
compartments into which the parcels are sorted, as shown in FIG. 3.
Afterwards, the parcels with DSNs of 1-100 are sorted into a first
compartment,
those with DSNs of 101-200 are sorted into a second compartment,
etc., the
parcels with DSNs of 701-800 are sorted into an eighth compartment.
Sorters
that only have to supply 700 or 600 DSNs correspondingly require less
compartments; with more than 800 DSNs, correspondingly more
compartments are
needed. To achieve an in-sequence arrangement of the parcels in
containers,
transferring from the stacking compartments of FIG. 3 into the
containers is
effected from right to left. The resulting sequence of the parcels
in the
containers is shown as an example in FIG. 4. Furthermore, the
parcels having
the lowest DSNs are stacked in the front part of the containers, and
those
having higher ones are stacked in the rear part of the containers.

(12)   In the method of the invention, with an appropriately
optimized sorting
plan it is ensured that it is very unlikely that the compartments
will be
overfilled. For the improbable case that overfilling does occur, two
to three
free overflow compartments can be allocated per row of stacking

compartments
that are inserted into the sequence by means of appropriate signalizing when
the compartments are emptied. Therefore, in case a stacking compartment is
filled to overflowing, one of the free overflow compartments, in which the
corresponding parcels are subsequently stacked, is allocated to this location
(destination). When the stacking compartments are emptied, the operator is
instructed by means of a blinker lamp, for example, to remove the overflow
compartment and to quit. Which overflow compartment is to be removed is
displayed in the stacking compartment display. Consequently, there are only a
few exceptions in the sequence of emptying the stacking compartments, while in
general no change is necessary during the course of the procedure.

(13)   For particularly simple and reliable emptying of the stacking
compartments, the stack container known from DE 3,823,644, which has a movable
bottom, is preferably used. This container permits direct stacking of the
parcels from the stacking compartment without the parcels needing to be lifted
by the operator or lifted above the edge of the container. Moreover, the use
of these containers also permits the parcels to be pushed directly from the
container into the input compartment of the input module. Because the parcels
are oriented toward the stack edge when inside the container, reorientation of
the parcels is not necessary.

(14)   In the above description, for simplification of a mail-sorting facility
having only one row of stacking compartments is the point of departure.
However, multiple-level arrangements of the stacking compartments are
conventional. Correspondingly, in the method of the invention, a
height-adjustable transfer bridge 6 is used with which the glide plane of the
transfer bridge can be raised or lowered, respectively, to the level of the
stacking compartment bottom. Correspondingly, a conveying device or a

conveying belt is disposed opposite each stacking compartment row
(grouping).
To go from the different heights of the conveying belts to the height
of the
input device, a movable height-compensating bridge is used.

CLAIMS:

We claim:

1. Method for sequencing parcels in aisle sequence during a
plurality of
sorting procedures in mail-sorting facilities that have rows of
stacking
compartments, comprising the steps of:

sorting of the parcels into the stacking compartments in
accordance with a
plan in which substantially every one of the stacking compartments is
filled at
the most to its maximum filling capacity during a sorting procedure,
wherein,
in case a stacking compartment is filled to overflowing, it is
allocated an
overflow compartment, in which the further stacking is effected;

during one sorting procedure the stacking compartments are not
emptied; and

performing after the end of a sorting procedure, an aisle-sequence
transfer
of the parcels from the stacking compartments into a conveying device
disposed
opposite the stacking compartments or into containers.

2. Method in accordance with claim 1, further comprising the step
of moving
a transfer bridge along the row of stacking compartments for transfer
into the
conveying device or the containers.

3. Method in accordance with claim 1, further comprising the step
of
filling the respective containers to their maximum receiving capacity
during
transfer.

4. Method in accordance with claim 1, further comprising the step
of

visibly signaling an operator in the event stacking has taken place in an
overflow compartment.

    5.   Method in accordance with claim 1, further comprising the step of
allocating to a location more than one stacking compartment.

    6.   Method in accordance with claim 1, further comprising the step of
bringing the containers onto a conveyor belt after transfer for further
processing of tile parcels.

    7.   Method in accordance with claim 1, wherein said performing step includes
providing said containers with movable compartment bottoms, said containers
being for direct stacking of the parcels.

	Type	Hits	Search Text
1	BRS	100	("5485613" "6442663" "5900001" "5903900" "5911144" "5915255" "5920876" "6038572" "6049810" "6115782" "4269347" "5746314" "5590332" "6047125" "4352616" "4413867" "4488649" "6415302" "6424977" "6434576" "6434577" "4248209" "4273491" "4293071" "4295579" "4319685" "4326226" "4425927" "4509893" "4566595" "4604018" "4787799" "4820103" "4874281" "4907151" "4920729" "4971513" "4995785" "5020304" "5226641" "5255967" "5267804" "5283893" "5424149" "5480135" "5492212" "5521112" "5538391" "5560003" "5617949" "5692185" "5697684" "5706938" "5758784" "5769406" "5772392" "5819304" "5826711" "6065915" "6073776" "6089637" "6192517" "6195221" "6247693" "5686339" "6016368" "3826349" "4178121" "4242928" "4244509" "4247893" "4250866" "4252043" "4266568" "4266665" "4280190" "4303179" "4312502" "4314403" "4328785" "4333574" "4350379" "4360231" "4366687" "4372722" "4377227" "4379514" "4386701" "4395941" "4409653" "4417546" "4422554" "4423827" "4426056" "4430817" "4438868" "4450949" "4465313" "4499448" "4513862").pn.
2	BRS	1714	(stack$4 near5 sequenc$4) and move
3	BRS	1	(stack$4 near5 sequenc$4) and move and (low near5 top) and computer and (number near5 sequence)
4	BRS	41	(stack$4 near5 sequenc$4) and move and (high near5 top)
5	BRS	24	(stack$4 near5 sequenc$4) and move and (high near5 top) and computer
6	BRS	13	(stack$4 near5 sequenc$4) and move and (low near5 top)
7	BRS	41	(stack$4 and sequenc$4) and (bubble near5 sort$4)
8	BRS	10	(stack$4 and sequenc$4) and (bubble near5 sort$4) and (container or article)
9	BRS	17	(stack$4 and sequenc$4) and (quick near5 sort$4)
10	BRS	3	(quicksort) and ("700"/$ or "414"/$ or "209"/$).ccls.
11	BRS	5	(stack$4 and sequenc$4) and (quick near5 sort$4) and (article or container)
12	BRS	154	(stack$4 and sequenc$4) and (sort$4 near5 (container or article))
13	BRS	2	(stack$4) and (sort$4 near5 (container or article)) and ((low near5 top) or (selquence near5 stack))
14	BRS	11	(stack$4) and (sort$4 near5 (container or article)) and ((low near5 top) or (sequence near5 stack))
15	BRS	17	(sort$4 near5 (container or article)) and ((low near5 top) or (sequence near5 stack))
16	BRS	853	(sort and stack and sequence and (article or container))
17	BRS	610	(sort and stack and sequence and (article or container)) and computer
18	BRS	1	bubblesort and stack and (article or container)

	DBs	Time Stamp	Comments	Error Definition
1	USPAT	2002/09/26 17:59		
2	USPAT	2002/09/26 18:00		
3	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 18:02		
4	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 18:09		
5	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/04/27 15:01		
6	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 18:03		
7	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 18:12		
8	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 18:11		
9	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 18:26		
10	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 18:21		
11	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 18:23		
12	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 18:35		
13	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 18:37		
14	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 18:42		
15	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 18:45		
16	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 18:46		
17	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 18:58		
18	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 18:53		

	Errors	Ref #
1		S1
2		S2
3		S3
4		S4
5		S5
6		S6
7		S7
8		S8
9		S9
10		S10
11		S11
12		S12
13		S13
14		S14
15		S15
16		S16
17		S17
18		S18

	Type	Hits	Search Text
19	BRS	37	(sort and (stack near5 sequence) and (article or container)) and computer
20	BRS	73	(sort and stack and sequence and (article or container)) and computer and (top near5 (high or low))
21	BRS	76	(sort and stack and (article or container)) and computer and (top near5 (high or low))
22	BRS	554	article and sort and stack and sequence
23	BRS	163	article and sort and stack and ((high or low) near5 number)
24	BRS	2316	imag$4 and sort and stack
25	BRS	183	imag$4 and (sort near5 stack)
26	BRS	17	(sequenc$3 near5 imag$4) and (sort near5 stack)
27	BRS	1	(209/584).ccls. and (restack$4)
28	BRS	8	(209/584).ccls. and ((restack$4) or (move near5 stack))
29	BRS	13	"5421464"
30	BRS	1	article and sort and stack and sequence and restack
31	BRS	2	"5421464".pn.
32	BRS	3	(quicksort) and ("700"/$).ccls.
33	BRS	942	("700"/223 or 700/224/ or 700/225/ or 700/226 or 700/218).ccls.
34	BRS	3	("700"/223 or 700/224/ or 700/225/ or 700/226 or 700/218).ccls. and gilman
35	BRS	2	"5421461".pn.
36	BRS	2	"5421464".pn.
37	BRS	19	("3913725" | "5097959" | "5097960" | "5119954").PN. OR ("5421464").URPN.
38	BRS	14	("3913725" | "5097959" | "5097960" | "5119954").PN. OR ("5421464").URPN. and stack
39	BRS	1	article and sort and stack and sequence and restack
40	BRS	382	(209/584).ccls.
41	BRS	210	(sort and stack and (article or container)) and computer and (top near5 (high or low))
42	BRS	246	imag$4 and (sort near5 stack)

	DBs	Time Stamp	Comments	Error Definition
19	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 18:54		
20	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 19:16		
21	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/05/13 17:27		
22	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/29 19:50		
23	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 19:38		
24	USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 19:39		
25	USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/05/13 17:27		
26	USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/26 19:40		
27	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/05/13 17:27		
28	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/29 19:44		
29	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2002/09/29 19:44		
30	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/05/13 17:26		
31	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/04/27 15:02		
32	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/05/13 17:16		
33	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/05/13 17:21		
34	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/05/13 17:23		
35	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/05/13 17:23		
36	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/05/13 17:23		
37	US-PGPUB; USPAT; USOCR	2005/05/13 17:24		
38	US-PGPUB; USPAT; USOCR	2005/05/13 17:24		
39	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/05/13 17:26		
40	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/05/13 17:27		
41	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/05/13 17:27		
42	USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/05/13 17:27		

	Errors	Ref #
19		S19
20		S20
21		S21
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